



**CLAIMS:** The following is a listing of all claims in the application with their status and the text of all active claims:

1. to 11. (CANCELED)

12. (CURRENTLY AMENDED) A set of mouthpieces for a predetermined kind of brass-wind instrument in which individual members of said set thereof have, respectively, contiguously conjoined elements of a rim, a cup-chamber, a backbore-chamber, and an external end-taper, the improvement comprising said individual members each having distinctly non-equal lengths as compared to other said individual members of said set, said individual members each having said external end-taper of a size substantially similar to said size of said external end-taper for all other respective members of said set, said set consisting of a minimum of three said respective members, and

~~The multiplicity of sets of brass-wind mouthpieces of Claim 1, considered separately,~~ wherein predetermined said distinctly non-equal lengths have respective volumetric sizes of said cup-chamber[[s]] and of said backbore-chamber[[s]] determined ~~by sixth means of~~ by :

- a. establishing predetermined [[L3]] lengths L3 substantially different than widely accepted music-industry standards for brass-wind mouthpiece lengths,
- b. encoding into a computer-aided-design software program predetermined external dimensions with dimensions of said rim for said each mouthpiece body,
- c. encoding predetermined constants of a center-bore diameter d1, a largest diameter of a backbore section d2, and total inner chamber volume v1, as substantially fixed design parameters,
- d. experimentally varying cup-chamber length L1 and backbore length L2 until volumetric chamber sizes of  $v2 + v3 = v1$ , as calculated by said computer-aided-design software program, where  $L1 + L2$  equals L3,

e. producing additional mouthpieces by varying rim shapes and cup-chamber diameters while holding constant volumetric size  $v_2$ ,  
~~to provide an alternative recitation of the elements in the parent claim plus one or more new element(s),~~ whereby reverse engineering methods create inversely-proportioned mouthpiece designs using predetermined increments of said lengths that are longer and/or shorter than prior-art-lengths.

13. to 16. (CANCELED)

17. (NEW) A set of mouthpieces for a predetermined kind of brass-wind instrument, wherein individual members of said set thereof each include, respectively, contiguously conjoined elements of a rim, a cup-chamber, a backbore-chamber, and an external end-taper, and wherein combined improvement within said set of mouthpieces comprises a set of at least three of said individual members each having a different length and a different volumetric cup-chamber, such that one said member has a shorter length and a larger volumetric cup-chamber size relative to another said member having a longer length and a smaller volumetric cup-chamber size thereby defining a relatively inversely-proportioned relationship between said length and cup-size chamber for each said member with said set, and wherein said individual members each having said external end-taper of substantially similar size, whereby changes in timbre of sound are strongly achieved through said set as a function of said different mouthpiece lengths and cup-chamber depths for the predetermined kind of brass-wind instrument and provides a visual cue through said different lengths aiding selection of one of said set to meet performance requirements for a particular style of music.

18. (NEW) The set of mouthpieces for a predetermined kind of brass-wind instrument of Claim 17, wherein each mouthpiece has separable sections selected from a group of rims sections, cup-chamber sections, backbore sections, tops sections, and bottoms section, said sections having fastening

means for interchanging similarly-fastened sections, to provide an alternative recitation of the parent claim plus one or more new element(s), whereby a logical exchange of interchangeable sections help musicians fine-tune playing characteristics of a mouthpiece, and whereby said separable sections are connected to separable prior-art sections for improved function of such prior-art sections.

19. (NEW) The set of mouthpieces for a predetermined kind of brass-wind instrument of Claim 17, wherein each mouthpiece has a substantially similar internal volumetric size, wherein internal volumetric size equates substantially to said volumetric cup-chamber size combined with said volumetric backbore-chamber size thereby providing constancy of internal volume and improved intonation qualities of said mouthpieces within said set.
20. (NEW) The set of mouthpieces for a predetermined kind of brass-wind instrument of Claim 17, wherein each mouthpiece has a substantially similar fundamental frequency of resonance when each mouthpiece body is closed shut where said cup-chamber adjoins said rim, thereby improving intonation qualities of each mouthpiece within said set.
21. (NEW) The set of mouthpieces for a predetermined kind of brass-wind instrument of Claim 17 further including a center-bore, to provide an alternative recitation of the parent claim plus one or more new element(s), whereby small variations in said center-bore size helps musicians vary performance characteristics of said set of mouthpieces.
22. (NEW) A method of approximating overall length of a mouthpiece for a predetermined kind of brass-wind instrument which includes the steps of:
  - a. measuring total inner chamber volume (v1) for a given working mouthpiece for said predetermined kind of brass-wind instrument,

- b. measuring a smallest diameter at a center-bore region (d1) of said given working mouthpiece,
- c. measuring a largest diameter of a backbore region (d2) of said given working mouthpiece,
- d. forming a first rim and a first adjoining cup-chamber of one of a larger and smaller size than inner cup-chamber volume of said given working mouthpiece,
- e. determining an axial length (L1) of said first adjoining cup-chamber,
- f. measuring inner volume of said first adjoining cup-chamber (v2),
- g. calculating inner volume of a first chamber bore-volume (v3) by subtracting said inner volume v2 from said total inner chamber volume v1,
- h. calculating a first backbore-chamber length (L2) according to the following equation:

$$L2 = \frac{3(v3)}{3.1416(R^2 + rR + r^2)} \quad \text{where } r = \frac{1}{2} d1$$
$$R = \frac{1}{2} d2 ,$$

- i. calculating total axial length (L3) for a new mouthpiece body by adding L1 with L2.

23. (NEW) A method of forming a set of mouthpieces for a predetermined kind of brass-wind instrument, which includes the steps of:

- a. measuring total inner chamber volume (v1) for a given working mouthpiece for said predetermined kind of brass-wind instrument,
- b. measuring a center-bore diameter (d1) of said given working mouthpiece,
- c. measuring a largest diameter of a backbore region (d2) of said given working mouthpiece,
- d. forming a first rim and a first adjoining cup-chamber of one of a larger and a smaller size than a cup-chamber volume of said given working mouthpiece,

- e. determining an axial length (L1) of said first adjoining cup-chamber,
- f. measuring inner volume of said first adjoining cup-chamber (v2),
- g. calculating inner volume of a first chamber bore-volume (v3) by subtracting said volume v2 from said total inner chamber volume v1,
- h. calculating an axial length of a first backbore-chamber length (L2) according to the following equation:

$$L2 = \frac{3(v3)}{3.1416(R^2 + rR + r^2)} \quad \text{where } r = \frac{1}{2} d1 \\ R = \frac{1}{2} d2 ,$$

- i. calculating total axial length (L3) for a new mouthpiece body by adding L1 with L2,
- j. forming a backbore chamber of length L2 onto said first adjoining cup-chamber opposite to said first rim,
- k. creating a frustoconical shape bore having volume v3 in said backbore-chamber where parameters d1, d2 and L2 substantially define said frustoconical shape bore and where the small end of said frustoconical bore shape abuts the small end of said cup-chamber,
- l. forming a first an external end-taper onto an outer surface of said backbore chamber substantially similar to an external end-taper region on said given working mouthpiece, and
- m. wherein said set is made by substituting an alternative volume for v2 of said adjoining cup-chamber volume and repeating steps d through l.

24. (NEW) New mouthpieces, individually, formed in accordance with combinations of Claim 12, Claim 17, Claim 18, Claim 19, Claim 20, Claim 21, Claim 22, and Claim 23.

25. (NEW) New mouthpiece sections, individually, formed in joint accordance with Claim 17 and Claim 18.